



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Makoto KOMATSUBARA et al.**

Art Unit: **1792**

Application Number: **10/548,409**

Examiner: **Xiao Si Zhao**

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For: **METHOD FOR DRYING COATING FILM, AND OPTICAL FILM**

Attorney Docket Number: **053077**

Customer Number: **38834**

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I am an inventor of the above-identified patent application.

I have read and am familiar with the above-identified patent application as well as the Official Action dated August 20, 2008, in the application.

I have read and am familiar with the contents of cited reference, U. S. Patent No. 5,694,701 to Huelsman cited in the Official Action in the above-identified application.

Under my supervision and control, the following experiments were conducted.

Explanation of Experiment and Results:

The accompanying Figures illustrate the experiment conducted.

Figure 1: Explanation of the experimental method.

Place a heating plate on a scale and form a coating layer (4cm x 4cm) thereon. Then, place a cooling plate oppositely with a gap. The coating liquid used in this experiment does not include a polymer. Huelsman discloses a polymer of 11.5% solid/MEK solution. However, since 11.5% solid is low in viscosity, existence of the polymer does not influence a drying rate of

initial stage. Further, the coating liquid used in this experiment is ethanol. The drying rate is converted into the case of MEK based on the result of the drying rate of ethanol.

Figure 2. Explanation of how to calculate a drying rate.

The present invention calculates a drying rate from change of weight. Drying rate ($\text{g/m}^2\cdot\text{s}$) can be calculated by measuring reduction of weight over time by a scale and dividing it by a square measure of the coating layer.

Figure 3. Explanation of converting drying rate of ethanol to that of MEK.

Generally, it is technical common sense that the ratio of vapor pressure and drying rate is the same, drying rate of MEK can be calculated by multiplying drying rate of ethanol by vapor pressure ratio.

Figure 4. A graph showing the ratio of the vapor pressure of MEK and that of ethanol.

Figure 5. Data of drying rate of ethanol in the case that gap, temperature of condensation platen and temperature of heating platen is changed.

Huelsman describes a condition that gap h_1 : 0.32cm, temperature of condensation platen: 27°C, temperature of heating platen: 82°C. However, since we do not have experimental data of the exactly same condition, we have calculated based on data under a different condition.

Since a formula at the lower right can be arrived at from each of the data, drying rate of each case can be calculated by entering gap, temperature of condensation platen, temperature of heating platen, to A, B, C of this formula, respectively.

As a result, it is found that drying rate of ethanol under the condition of gap h_1 : 0.32cm, temperature of condensation platen: 27°C, temperature of heating platen: 82°C is $2.6 \text{ g/m}^2\cdot\text{s}$.

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Figure 6. Explanation material of MEK drying rate conversion under the condition of Huelsman.

As explained in the third sheet, drying rate of MEK can be calculated by multiplying drying rate of ethanol by vapor pressure ratio.

As a result, it is found that drying rate of MEK is $2.3 \text{ g/m}^2 \cdot \text{s}$.

From the attached experimental results, I have concluded, among other things, that I did not get any data on drying rate by means of condensation dryer similar to U. S. Patent No. 5,694,701 with ethanol below $0.1 \text{ g/m}^2 \cdot \text{s}$.

Predicted value on drying rate with the condition in U. S. Patent No. 5,694,701 is approximately $2.3 \text{ g/m}^2 \cdot \text{s}$. (Figure 7).

The undersigned declares that all statements made herein of his own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.


Makoto Komatsubara

Signed this 25 day of November, 2008.